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(54) Name of Device: Air Purifier

(21) Application Number: S60-110701

(22) Date of Application: July 19, 1985

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(74) Agent: Yukio OMATA, Patent Attorney, and 1 other

(57) Scope of the Utility Model Registration claims

1. In vertical air purification equipment where a dust collection element is placed inside the main body of an air purifier in which an intake opening is arranged at the bottom, an outlet opening is arranged at the top, and a blower fan is placed at the top end, an air purifier has a double-cylinder structure by having a predetermined gap between a cylindrical dust collection section and a body, which is an exterior frame separated by the required gap in which a ventilation channel is formed from the bottom opening of the dust collection element, which runs inside the main body of the air purifier so as to pass through this gap, and is guided to the blower at the top end, and whose main body also can be freely removed with the line at the top of the dust collection part as the separation line.

2. The air purifier as set forth in Paragraph 1 of the Scope of the Utility Model Registration Claim wherein the dust collection section is comprised of a filter layer, a cylinder portion that is comprised of a permeable earth electrode, and a needle electrode that is arranged in the center of the lower end of said cylinder portion.

3. The air purifier as set forth in Paragraph 1 of the Scope of the Utility Model Registration Claim wherein the outlet opening is an outlet opening that blows out air from the entire regions around the periphery of the body.

Brief Description of the Drawings

This brief description of the drawings presents an embodiment of the present device. Fig. 1 shows a partial cutaway front view; Fig. 2 is an explanatory drawing of the main body in a separated condition; Figs. 3 and 4 show partial cross-section views of the dust collection element.

1...Main body, 3...Inlet opening, 4...Outlet opening, 5...Air permeable grounding electrode, 6...Activated charcoal filter, 7...Filter, 8...Dust collection element, 9...Needle electrode, 11, 12...Partition plate.

FIG. 2

FIG. 3

[see original for figures]

FIG. 4

FIG. 1

[see source for diagram]

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SPECIFICATION

1. Name of the Device
Air Purifier

2. Scope of the Utility Model Registration Claims

1. In vertical air purification equipment where a dust collection element is placed inside the main body of an air purifier in which an intake opening is arranged at the bottom, an outlet opening is arranged at the top, and a blower fan is placed at the top end, an air purifier has a double-cylinder structure by having a predetermined gap between a cylindrical dust collection section and a body, which is an exterior frame separated by the required gap in which a ventilation channel is formed from the bottom opening of the dust collection element, which runs inside the main body of the air purifier so as to pass through this gap, and is guided to the blower at the top end, and whose main body also can be freely removed with the line at the top of the dust collection part as the separation line.

2. The air purifier as set forth in Paragraph 1 of the Scope of the Utility Model Registration Claim wherein the dust collection section is comprised of a filter layer, a cylinder portion that is comprised of an air permeable earth electrode, and a needle electrode that is arranged in the center of the lower end of said cylinder portion.

3. The air purifier as set forth in Paragraph 1 of the Scope of the Utility Model Registration Claim wherein the outlet opening is an outlet opening that blows out air from the entire regions around the periphery of the body.

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3. Detailed Description of the device
<Industrial Field of Application>

The present device is one that relates to a vertical air purifier having a cylindrical dust collection element.

<Prior Art>

Historically, a dust collection element utilized in an air purifier like this, the type in Japanese Laid-Open Utility Model Application S55-61424, for example, is known. This structure is flawed in that the number of electrodes is too great, however, because it raises the dust collecting efficiency of the dust collection element by providing electrostatic charge elements other than a dust collection element, and is also high in cost because it uses discharge wires. Moreover, the current flowing between electrodes is sizeable in a type where dust collection is carried out by inserting an [REDACTED] filter between two air permeable flat electrodes, and there is a greater occurrence of ozone (which is harmful). There are also significant variations in current flow between electrodes due to dirt of the [REDACTED] filter and humidity, and this is something that in turn affects dust collection efficiency.

Additionally, the places where table top models can be located are limited for the structure of the air purifier itself, and wall-mounted units

require effort in placement and become difficult to operate.

Further, the use of a cylindrical electrical dust collection mechanism to improve the above-mentioned drawbacks is inconvenient from a maintenance standpoint in terms of filter replacements.

<Problem(s) that the Device is to Solve>

In light of the facts outlined above, the objective is to provide an air purifier where a body and a dust collection section are double-fitting cylinders; an inflow of dirty air from the lower portion and a discharge of cleaned air from the upper portion results in the realization of a simple structure; and, the body is a separable type, and where these designs enable the elimination of a conventional defect(s).

In the vertical air purifier provided, provided with a dust collection element in the main body with an air intake opening at the bottom and air outlet openings at the top, wherein a blower is provided at the top end, the present device has a double-wall cylindrical dust collection element in which the main body, which serves as an outer frame, has inside a needle electrode and a filter as well as an air-permeable grounded electrode. A divider panel is provided at the top of the air inlet opening of the dust collection element and the

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main body, as well as the top of the dust collection element; a vent duct is a passage that flows air upward from the inside of the dust collection section toward the blower fan via the internal circumference of the body, and the main body is structured so that it can be separated at the location of the upper separator panel.

<Operation>

Due to the configuration stated above, dirty air that flows in through the inlet opening at the bottom is guided into the cylindrical dust collection element that has a needle electrode in its center, with negative high voltage having been applied to said needle electrode a strong current is applied by means of this needle electrode, thereby charging the dust particles that have negative ions, and the filter efficiently collects the charged dust particles at the same time. The air which has now become clean, is discharged from the top of the main body through the outer perimeter without creating drift. Moreover, since the main body can be freely taken apart at the location where the dust collection element is installed, filter replacement and other maintenance tasks are easily performed.

<Embodiments>

The description of an embodiment of the present device below will be made with reference to the drawings.

1 is the main body of a vertical (standing-type) air purifier wherein a

pedestal portion 2 is arranged at the lower end of the of the body 1, and an air inlet opening 3 and an air outlet opening 4 are installed around the lower periphery and around the upper periphery of the body, respectively. In the inside of the main section of said main body 1, an air-permeable grounded electrode 5, an activated charcoal filter 6, and a dielectric fiber filter 7 are layered to form a cylindrical dust collection element 8, and a double-wall cylindrical structure is formed with the required ventilation gap a in between the walls, a needle electrode 9 that applies a high voltage negative charge is located in the center position of the bottom opening 8a of the dust collection element 8. In addition, partition plates 11 and 12 are installed at the top and bottom edges of said dust collection element 8, and these partition plates are installed within the main body 1, the division section 13, which will be a male/female fitting of the body 1, is positioned on the horizontal line b of the upper partition plate 12, a motor 15 is provided in the upper space 14 of the partition plate 12, and said fan 16 section is installed on the inside 17 of the outlet opening 4, and all of these sections comprise the air purifier device 18.

Figs. 3 and 4 show the relationship between the dielectric fiber filter 7 and the air-permeable grounding electrode 5, in which these may acceptably be either of an assembled type in which inner elements and outer elements are assembled, or of a layered type in which the inner and outer elements are unitized into one piece.

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By way of explaining the operation of this device, dirty air A flows in first through the inlet opening 3 at the bottom of the main body 1 and flows around the interior of the cylindrical dust collection element 8 from the dish-shaped support frame 19 on which is disposed a needle electrode 9. In this case, because the needle electrode 9, where a negative high voltage has been applied, is positioned at the opening 8a of the dust collection section 8, anions are being generated, and dust particles that pass the surface of the opening 8a will be charged, and the filter 7 that is made of dielectric fibers will also be charged, so the dust particles will be collected with high efficiency.

In this manner, purified air B from which dust particles have been removed by the dust collection element 8 is discharged from the dust collection element 8 through the ventilation gap a in the main body 1 by the motor 15 and fan 16, and discharged from the outlet opening 4, which is arranged around the periphery of the body 1. At this time, the air flowing in the vicinity of the motor 15 also serves to cool the motor.

Moreover, with regard to replacing the filter, as shown in Fig. 2, a head section 1a, which is situated at the outlet opening 4 side when the division section 13 of the body 1 is regarded as a boundary, and the dust collection element 8 that is supported by

the partition plate 12 inside is revealed so that filter replacement can easily be effected. Naturally, motor 15 and fan 16, among other elements in the head section 1a can easily be maintained at the same time.

<Effects of the Device>

By providing an inlet opening at the bottom of the main body and an outlet opening at the top of the main body, and by creating a dust collection element having a double-walled cylindrical structure that principally consists of a needle electrode, a filter, and an air-permeable grounded electrode, and by providing a main body that can be separated, the following effects of the air purifier device of the present device described above can be obtained:

- a. Maintenance is simplified by the fact that the motor, the fan and the outlet opening can be detached all as one unit.
- b. Air intake is performed all around the main body, so dirty air can be drawn in over a wide range.
- c. The outlet opening is situated at the top of the main body, so dust on floors and table tops is not blown about.
- d. The inlet opening is situated at the bottom, so relatively large dust particles on floors and table tops can be drawn in.

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- e. Clean air that has been purified by the unit is discharged along the entire periphery of the main body and flows widely around the room.
- f. Excellent dust collection effects are obtained through the use of a cylindrical dust collection mechanism.
- g. There is virtually no generation of ozone.

<Brief Explanation of the Drawings>

This brief explanation of the drawings presents an embodiment of the present utility model application. Fig. 1 shows a partial cutaway front view; Fig. 2 is an explanatory drawing of the main body in a separated condition; Figs. 3 and 4 show partial cross-section views of the dust collection element.

- 1 Main body
- 3 Inlet opening
- 4 Outlet opening
- 5 Air permeable grounding electrode
- 6 Activated charcoal filter
- 7 Filter
- 8 Dust Collection Element
- 9 Needle electrode
- 11, 12 Partition plate
- 13 Separating element
- 15 Motor
- 16 Fan
- a Ventilation gap

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Agent: Yukio OMATA, Patent Attorney

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FIG. 1

[see source for diagram]

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FIG. 2

[see source for diagram]

FIG. 3

FIG. 4

[see source for diagrams]

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④ 日本国特許庁 (J P)

⑤ 実用新案出願公開

⑥ 公開実用新案公報 (U)

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発明の名称 空気清浄機

⑧ 実 願 昭60-110701

⑨ 出 願 昭60(1985)7月19日

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実用新案登録請求の範囲

下部に吸入口、上部に吹出口を配す本体内に集塵部を設け、且つ上部に送風機を備えた型空気清浄機において、筒形集塵部を外枠となる枠に所定間隙を介し二重円筒構造とし、通風を集塵部下端開口より本体内部となる動空間部を経て上端送風機へ送る通路とし、且つ本を、集塵部上端縁上を分割線として分離自在な空気清浄機。

集塵部は、フィルター層、通気性接地電極となる筒部と、該筒部の下端中心に配す針電極となる実用新案登録請求の範囲第1項記載の空気清浄機。

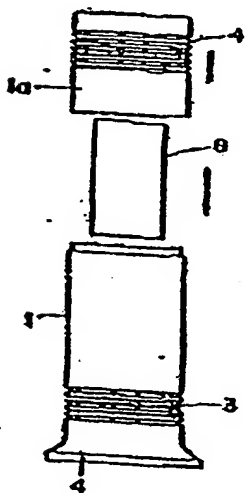
3 吹出口が、本体外周全境より吹出す吹出口である実用新案登録請求の範囲第1項記載の空気清浄機。

図面の簡単な説明

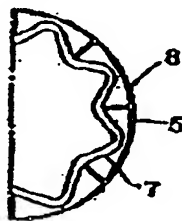
図面の簡単な説明は本考案の実施例を示すもので、第1図は一部切欠正面図、第2図は本体の分状状態の説明図、第3図、第4図は集塵部の一部断面図である。

1—本体、2—吸入口、4—吹出口、5—通気性接地電極、6—活性炭フィルター、7—フィルター、8—集塵部、9—針電極、11、12—仕切板、13—分割部、15—モーター、16—ファン、a—通風間隙。

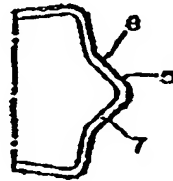
第2図



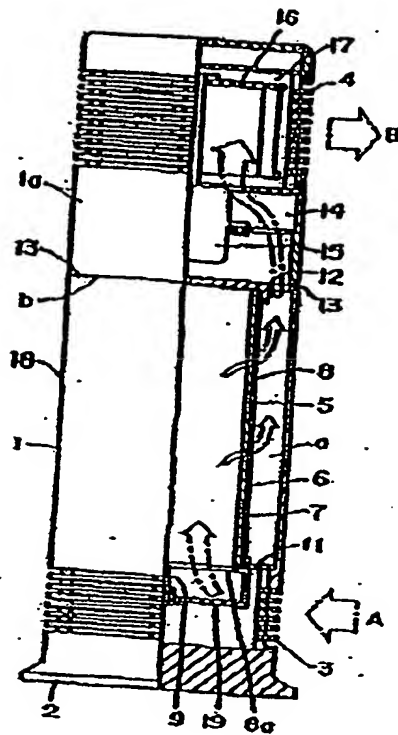
第3図



第4図



第1図



公開実用 昭和62- 20653

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④ 実用新案出願公開

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⑧ 考案の名称 空気清浄機

⑨ 実 願 昭60-110701

出 願 昭60(1985)7月19日

| | | | |
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明 細 書

1. 考案の名称

空気清浄機

2. 実用新案登録請求の範囲

1. 下部に吸込口、上部に吹出口を配す本体内に集塵部を設け、且つ上部に送風機を備えた竪型空気清浄機において、筒形集塵部を外枠となる本体に所定間隙を介し二重円筒構造とし、通風路を集塵部下端開口より本体内周となる前記間隙部を経て上端送風機へ導く通路とし、且つ本体を、集塵部上端線上を分割線として分離自在とした空気清浄機。

2. 集塵部が、フィルター層、通気性接地電極よりなる筒部と、該筒部の下端中心に配す針電極よりなる実用新案登録請求の範囲第1項記載の空気清浄機。

3. 吹出口が、本体外周全域より吹出す吹出口である実用新案登録請求の範囲第1項記載の空気清浄機。

3. 考案の詳細な説明

〈産業上の利用分野〉

本考案は筒形集塵部をもつ竖型の空気清浄機に関するものである。

〈従来の技術〉

従来、この種の空気清浄機に用いられている集塵部としては、例えば実開昭55-61424号公報のタイプが知られている。しかし、この構造は、集塵部の他に帯電部を設けて集塵効率を向上させるため、電極数が多くなる欠陥を有し、且つ放電線を使用しているためコスト高ともなる。また、2枚の通気性平板電極間に誘電体フィルターを挿入して集塵を行なうタイプにあっては、電極間に流れる電流が多く、且つオゾン（有害）の発生も多くなる。しかも誘電体フィルターの汚れ、湿度により電極間を流れる電流が大きく変化し、これが集塵効率にも影響するものとなる。

更に、空気清浄機自体の構造としては、卓上型にあっては設置する場所が限定され、壁掛け

型にあっては設置するために手間がかかり、且つ操作がしにくいものとなっている。

また、前記欠陥を改善せしめるべく筒形の電気集塵機構を採用した場合、これにあってはフィルター交換等のメンテナンス作業が不便となるものである。

〈考案が解決しようとする問題点〉

本考案は上記実情に鑑み、本体と集塵部を二重嵌合の円筒とし、下部より汚れた空気を流入させ上部にて清浄空気を排出することにより簡略構造とし、且つ本体を分割タイプとしたことにより、従来の欠陥を一掃し得る空気清浄機を提供することを目的としたものである。

〈問題点を解決するための手段〉

本考案は、下部に吸込口を上部に吹出口を配す本体内に集塵部を設け、且つ上端に送風機を備えた縦型空気清浄機において、外枠となる本体内に針電極とフィルター、通気性接地電極との組合せとなる筒形集塵部を二重とし、且つこの吸込口側の集塵部と本体及び集塵部上面に仕

切板を設け、通気路を集塵部内から本体内周を
経て送風機側に向う上流れ通路とし、また上方
の仕切板位置の本体を分割構造としたものであ
る。

〈作 用〉

上記のような構成のため、下部の吸込口から
流入した汚れた空気を、中心に針電極を有する
筒形集塵部内に導くことにより、該針電極に印
加の負の高電圧で負イオンを有しダスト粒子を
帯電させると同時に、フィルター側も帯電させ
てダスト粒子を高効率で捕集する。また、この
清浄となった空気は本体上部より外周方向へ排
出され、偏流を招かず、しかもこの本体にあっ
ては集塵部セット位置で分割自在としてなるた
め、フィルター交換等のメンテナンスも便利と
なる。

（実施例）

以下、本考案を実施例の図面に基づいて詳述
すれば、次の通りである。

1は下端に台座部2を配し下部周囲に吸込口

3と上部周囲に吹出口4を設けた豎型（スタンド型）の空気清浄機本体で、該本体1の主部内側に、外側より通気性接地電極5と活性炭フィルター6と誘電体繊維のフィルター7を積層して形成した筒形集塵部8を、所定の通風間隙aを介して同芯となるよう二重円筒構造とし、且つ前記集塵部8の下端開口8aの中心位置に負の高電圧を印加する針電極9を設置する。また、この集塵部8の上下縁は本体1内にセットする仕切板11、12にて取付けられ、上部の仕切板12の水平線b上に本体1の断縁嵌合となる分割部13を位置せしめ、且つ仕切板12の上部空間14にモーター15を設け、このファン16部を吹出口4の内部17へ設置し、全体として空気清浄機18としてなる。

尚、集塵部8にあつて、誘電体繊維のフィルター7と通気性接地電極5との関係は、第3図、第4図に示すような内郭と外郭に分れた組合せタイプか、内郭と外郭を一体とする積層タイプとしてもよい。

いまこの作用を説明すると、先ず汚れた空気Aは本体1の下部の吸込口3より流入し、針電極9を配す受皿状支持棒19内より筒形の集塵部8の内部へ廻り込むものである。この場合、集塵部8の開口8a部には負の高電圧を印加された針電極9が位置するため、負イオンが発生しており、開口8a面を通過したダスト粒子は帯電し、誘電体繊維からなるフィルター7も帯電するのでダスト粒子は高効率で捕集される。

このように、集塵部8によりダスト粒子を除去された清浄となる空気Bは、該集塵部8から本体1との通風間隙aを経てモーター15とファン16によって、該本体1の外周面に配す吹出口4より排出される。この時、空気はモーター15の周囲を流れるために冷却効果も兼ねるものとなる。

また、フィルター交換に当っては、第2図に示す如く本体1の分割部13を境として吹出口側となる頭部1aを上方へスライドさせれば簡単に外れ、内部に仕切板12にて支持された集

図部 8 が現われるため、フィルター交換が容易に行なえる。勿論、これと同時に頸部 1 a 側のモーター 15 やファン 16 等のメンテナンスも簡単に行ない得る。

〈考案の効果〉

上述のように本考案の空気清浄機は、本体下部に吸込口を上部に吹出口を配すると共に、本体主部内に針電極とフィルター及び通気性接地電極よりなる集塵部を二重円筒構造とし、且つ本体を分割形としたことにより、次のような効果を得る。

- a. モーター、ファン、吹出口を一体化して取り外せるためにメンテナンスが便利となる。
- b. 本体の側面の全周で吸込むため、汚れた空気を広い範囲にわたって吸込むことが出来る。
- c. 吹出口を本体の上部に設置したため、床とか机の上の埃を散乱させない。
- d. 吸込口を下端に設置したため、床とか机の上の比較的大きな埃を吸込み得る。

- e. 本体側面の全周吹出しにより吊静されたきれいな空気が室内の広い範囲にいきわたる。
- f. 筒形の集塵機構の採用により集塵効果が良い。
- g. オゾンがほとんど発生しない。

4. 図面の簡単な説明

図面の簡単な説明は本発案の実施例を示すもので、第1図は一部切欠正面図、第2図は本体の分割状態の説明図、第3図、第4図は集塵部の一部断面図である。

1…本体、3…吸込口、4…吹出口、5…通気性接地電極、6…活性炭フィルター、7…フィルター、8…集塵部、9…針電極、11、12…仕切板、13…分割部、15…モーター、16…ファン、a…通風間隙。

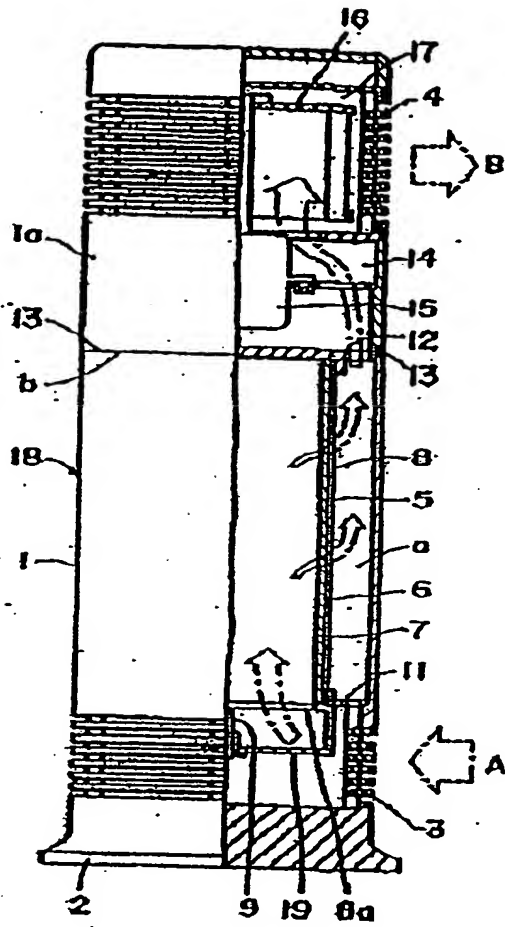
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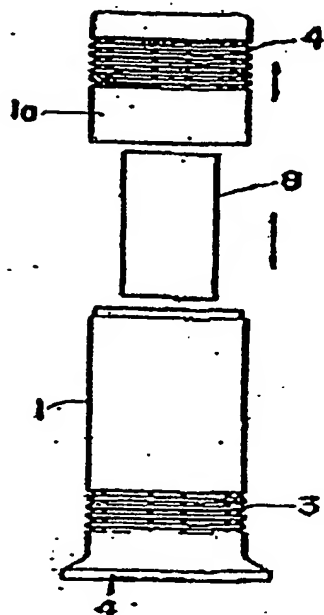
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第 1 圖

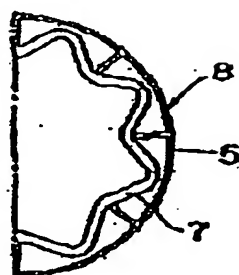


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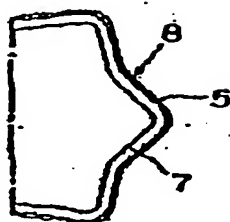
第 2 図



第 3 図



第 4 図



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